Experiments on Robust Network Capacity Design in Telecommunication based on a Second Order Cone Model for Chance Constraints

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Abstract: Given a backbone network for telecommunication with uncertain demand between any pair of nodes the task is to find capacities for the links in the network so that all demand can be routed through the network with high probability. Our model is based on a multicommodity flow formulation for routing the demand between any two nodes with chance constraints coupling flow and capacity values on each link. If the demand can be approximated reasonably by a multivariate normal distribution a standard approach is to reformulate the chance constraints as second order cone constraints. In practice, demand is given via past traffic matrices that typically exhibit rather strong fluctuations. The purpose of this study is to investigate wether this second order cone approach is helpful in spite of the rather bad match between data and required distribution properties. To evaluate the quality of this approach is, we use in our ongoing work data from the US research and education network ABILENE as underlying testinstances. Our next step will be to investigate how other approaches like probablistic programming or sampled convex approximations behave in comparison to this second order cone approach.

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